

## CLAIMS

1. A digital video recorder comprising:

an analog video decoder having an analog to digital converter and an input for receiving analog video signals;

an analog video encoder having a digital to analog converter and an output for transmitting analog video signals;

at least one digital disk for storing and playing back video data; and

a video compression encoder and decoder connected through a multiport memory controller to said at least one digital disk; and

a synchronizing time generator;

wherein said multiport memory controller comprises a field programmable gate array.

2. In a digital video recorder having at least one disk drive for storing video data, a recording method comprising the steps of:

calculating the starting disk address for each video frame and placing said addresses in an index table;

initializing the index table for use upon startup;

forming a sequential set of disk addresses corresponding to a starting address and the address of each disk block corresponding to subsequent frames in a recorded video clip;

appending frame addresses to the index table sequentially during  
10 recording;  
indicating the free space available in the index table for recorded video  
frame addresses;  
closing index table space upon termination of recording; and  
writing a record of the index table to the disk drive.

3. In a digital video recorder having at least one disk drive for storing video  
data, a loop recording method comprising:

a) maintaining an index table for storing disk addresses for recorded  
video;

b) allocating free space on said disk and in said index table to additional  
video recording;

c) keeping track of available disk free space and available index table  
free space to determine when either such free space is becoming exhausted by  
new recorded video;

10 d) overwriting video data after said free space is exhausted while  
deallocating such overwritten data; and

e) providing a loop remnant directory to determine a changing boundary  
between newly recorded video and previously recorded video.

4. The loop recording method recited in claim 3 wherein the digital video recorder comprises a recording circuit board and said steps a) through e) are carried out using said recording circuit board and wherein said digital video recorder also comprises a playback circuit board in communication with said recording circuit board for carrying out the additional steps of:

- f) creating an index table for newly recorded material
- g) generating data structures for video playback; and
- h) deallocating video frames from said data structures and indices from said index table as said loop recording overwrites video frames.

5. In a digital video recorder, a method for allocating memory cycles to dynamically adjust for unpredictable data flow requirements, the recorder having multiple ports, multi-level port request logic, arbitration logic and sequencing logic; the method comprising the steps of:

- a) using said port request logic to examine data flow, develop an estimate of the urgency for port service and presenting a multi-level request to the arbitration logic, said request representing the estimated level of data urgency;
- b) employing said arbitration logic to examine requests from all ports to select one port having the highest urgency level, generate port selection signals and send a start of cycle signal to said sequencing logic;
- c) generating in said sequencing logic, control signals to cycle memory and transfer data;

d) transferring data from the selected port to and from memory under control of the sequencing logic;

15 e) terminating the current cycle upon completion of data transfer; and

f) using said arbitration logic to select a port for the next cycle.

6. A method for dynamically metering compressed video data rates to accommodate maximum disk data rates in a digital video recorder hard disk without dropping frames during recording; the method comprising the steps of:

a) statistically monitoring disk performance;

5 b) comparing said performance to the video frame rate to determine the disk's actual maximum data rate in real time;

c) reprogramming the compression target data rate to the maximum disk supportable data rate in the event that the disk cannot sustain a configured data rate; and

10 d) iteratively repeating step c) continuously adjusting compression data rate to the lesser of maximum disk data rate and selected compression level.